



ABSTRACT

Much Heavy-oil exists in the Alaskan Arctic, below thick Permafrost zones, and Offshore, in deep water: two Cold-environments reducing Heavy-oil fluidity. Steam injection from cold surfaces can economically restore Heavy-oil fluidity downhole, and recover it, but environmental heat-loss from well tubulars carrying Steam or heated Heavy-oil must be minimized. Combining a precise flow-control of various well-fluids between four compartments within a multilateral well and its several branch-wells, insulated by two shared internal thermal barriers, provides a way of doing it, without adverse environmental effects. The flow-control system and its method of optimal operation require to:

- a) circulate from the surface and re-heat downhole, a coldest gas for sub-cooling the well casing,
- b) gas-lift hot Heavy-oil in insulated tubings to the well-head from several branch-wells,
- c) simultaneously carry Steam downhole from the surface with minimum heat-loss,
- d) sequentially switch Branch-wells from Steam injection and soaking to Heavy-oil production, and vice-versa.